CLAIMS

1. A process for producing a cycloolefin addition polymer, comprising addition-polymerizing one or more cycloolefin monomers comprising a cycloolefin compound represented by the following formula (1) in the presence of a multi-component catalyst comprising:

(a) a palladium compound, and

(b) one or more phosphorus compounds selected from the group consisting of the following compounds (b-1) and (b-2):

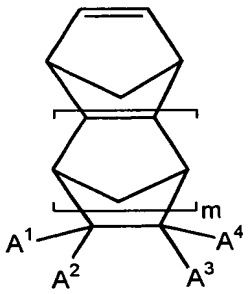
(b-1) a phosphonium salt represented by the following formula (b1):

$$[PR^2R^3R^4R^5]^+[CA_1]^- \qquad (b1)$$

wherein P is a phosphorus atom, R^2 is a substituent selected from a hydrogen atom, an alkyl group of 1 to 20 carbon atoms, a cycloalkyl group and an aryl group, R^3 to R^5 are each independently a substituent selected from an alkyl group of 1 to 20 carbon atoms, a cycloalkyl group and an aryl group, and $[CA_1]^-$ is a counter anion selected from a carboxylic acid anion, a sulfonic acid anion and a superstrong acid anion containing an atom selected from B, P and Sb and a F atom,

(b-2) an addition complex of a phosphine compound that contains a substituent selected from an alkyl group

of 3 to 15 carbon atoms, a cycloalkyl group and an aryl group and has a cone angle (θ deg) of 170 to 200 and an organoaluminum compound;



(1)

wherein A^1 to A^4 are each independently an atom or a group selected from the group consisting of a hydrogen atom, a halogen atom, an alkyl group of 1 to 15 carbon atoms, a cycloalkyl group, an aryl group, an ester group, an oxetanyl group, an alkoxy group, a trialkylsilyl group and a hydroxyl group, and may be each bonded to a cyclic structure through a bond group of 0 to 10 carbon atoms, said bond group containing at least one group or atom selected from an alkylene group of 1 to 20 carbon atoms, an oxygen atom, a nitrogen atom and a sulfur atom, A^1 and A^2 may form an alkylidene group of 1 to 5 carbon atoms, a substituted or unsubstituted alicyclic or aromatic ring of 5 to 20 carbon atoms or a heterocyclic ring of 2 to 20 carbon atoms, A^1 and A^3 may form a substituted or unsubstituted alicyclic or aromatic ring of 5 to 20

carbon atoms or a heterocyclic ring of 2 to 20 carbon atoms, and m is 0 or 1.

2. The process for producing a cycloolefin addition polymer as claimed in claim 1, wherein the multi-component catalyst further comprises, in addition to the component (a) and the component (b-1),

(c) a compound selected from an ionic boron compound, an ionic aluminum compound, an aluminum compound of Lewis acidity and a boron compound of Lewis acidity.

3. The process for producing a cycloolefin addition polymer as claimed in claim 1 or 2, wherein the multi-component catalyst further comprises, in addition to the component (a) and the component (b-2),

(d) an organoaluminum compound.

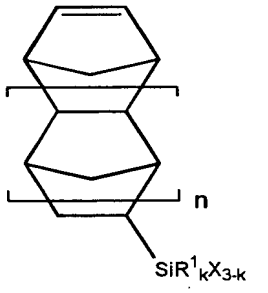
4. The process for producing a cycloolefin addition polymer as claimed in claim 3, wherein the content of the organoaluminum compound (d) is in the range of 0.1 to 200 mol based on 1 gram atom of palladium of the palladium compound (a).

5. The process for producing a cycloolefin addition polymer as claimed in any one of claims 1 to 4, wherein the palladium compound (a) is an organic carboxylate of palladium or a β-diketone compound of palladium.

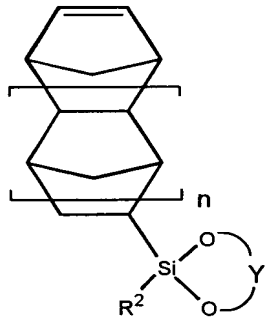
6. The process for producing a cycloolefin addition polymer as claimed in any one of claims 1 to 5, wherein the multi-component catalyst is a catalyst prepared in the presence of at least one compound selected from the group consisting of a polycyclic monoolefin or non-conjugated diene having a bicyclo[2.2.1]hept-2-ene structure, a monocyclic non-conjugated diene and a straight-chain non-conjugated diene.

7. The process for producing a cycloolefin addition polymer as claimed in any one of claims 1 to 6, wherein the multi-component catalyst is a catalyst prepared in the presence of bicyclo[2.2.1]hept-2-ene and/or a bicyclo[2.2.1]hept-2-ene derivative having one or more hydrocarbon groups of 1 to 15 carbon atoms.

8. The process for producing a cycloolefin addition polymer as claimed in any one of claims 1 to 7, wherein the cycloolefin monomers contain a cycloolefin compound represented by the following formula (2)-1 or (2)-2:



(2)-1



(2)-2

wherein R^1 and R^2 are each a substituent selected from an alkyl group of 1 to 10 carbon atoms, a cycloalkyl group and an aryl group, X is an alkoxy group of 1 to 5 carbon atoms or a halogen atom, Y is a residue of a hydroxyl group of an aliphatic diol of 2 to 4 carbon atoms, k is an integer of 0 to 2, and n is 0 or 1.

9. The process for producing a cycloolefin addition polymer as claimed in claim 8, wherein the

cycloolefin compound represented by the formula (2)-1 and/or the cycloolefin compound represented by the formula (2)-2 is used in a total amount of 0.1 to 30% by mol in the whole amount of all the cycloolefin monomers.

10. The process for producing a cycloolefin addition polymer as claimed in any one of claims 1 to 9, wherein the cycloolefin monomer of the formula (1) in which A^1 to A^4 are each independently a hydrogen atom or a hydrocarbon group of 1 to 15 carbon atoms is used in an amount of not less than 50% by mol in the whole amount of all the cycloolefin monomers.